



WHAT are POLLUTION, SMOKE, smog, and more...



PEARSON
Longman



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IT'S IN THE AIR



Simply put, 'pollution' means dirtying the surroundings around us. And everything that dirties any part of the environment – air, water, soil, and so on – is known as a 'pollutant'.

What is air pollution?

The dirtying of air is known as air pollution.

Fumes and smoke from factories and cars dirty the air and cause 'outdoor' air pollution. Many natural events such as forest fires and volcanic eruptions, which throw ash, soot, and harmful gases into the atmosphere, can also pollute air.

Indoor air pollution

The air inside our homes is not that clean either.

Burning wood, dung or coal for cooking or heating can cause indoor pollution and harm living beings. Even building materials such as asbestos and lead can pollute the air indoors and make people ill.



Aerosol sprays can cause indoor air pollution.

Reducing air pollution

To reduce air pollution people need to know how harmful it can be. The next step is to learn about clean technologies, the use of which can help reduce the amount of poisonous gases in the atmosphere.

It isn't very hard to control air pollution if we all try!

The poisonous gases released from vehicles and factories are the worst polluters of the atmosphere.



Even the cozy fireplace dirties the air indoors.



**GG 4.0
Greencast
Tobacco smoke,
released from
cigarettes and cigars,
contains about four
thousand different
harmful chemicals!**



WHAT'S THAT YOU'RE BREATHING?

Every time we breathe, we inhale something more than air. This 'something more' could be soil, dust, pollens, moulds, ash, soot, aerosols (solid particles present in the air), and liquid droplets. Called particulate matter, these particles may be as big as grains of sand and dirt or may be tiny specks that can only be seen under a microscope.

Can pretty flowers add to pollution? Yes, pollen from flowers can pollute the air and cause allergies!

Where did it come from?

These particles come from agricultural activity, vehicle fumes, and smoke from factories. Some also occur naturally—from volcanoes, duststorms, forest fires, and sea sprays.

When volcanoes erupt, they spew large amounts of ash and smoke into the atmosphere. All those tiny particles can clog your lungs!

The use of coal is harmful for the environment.



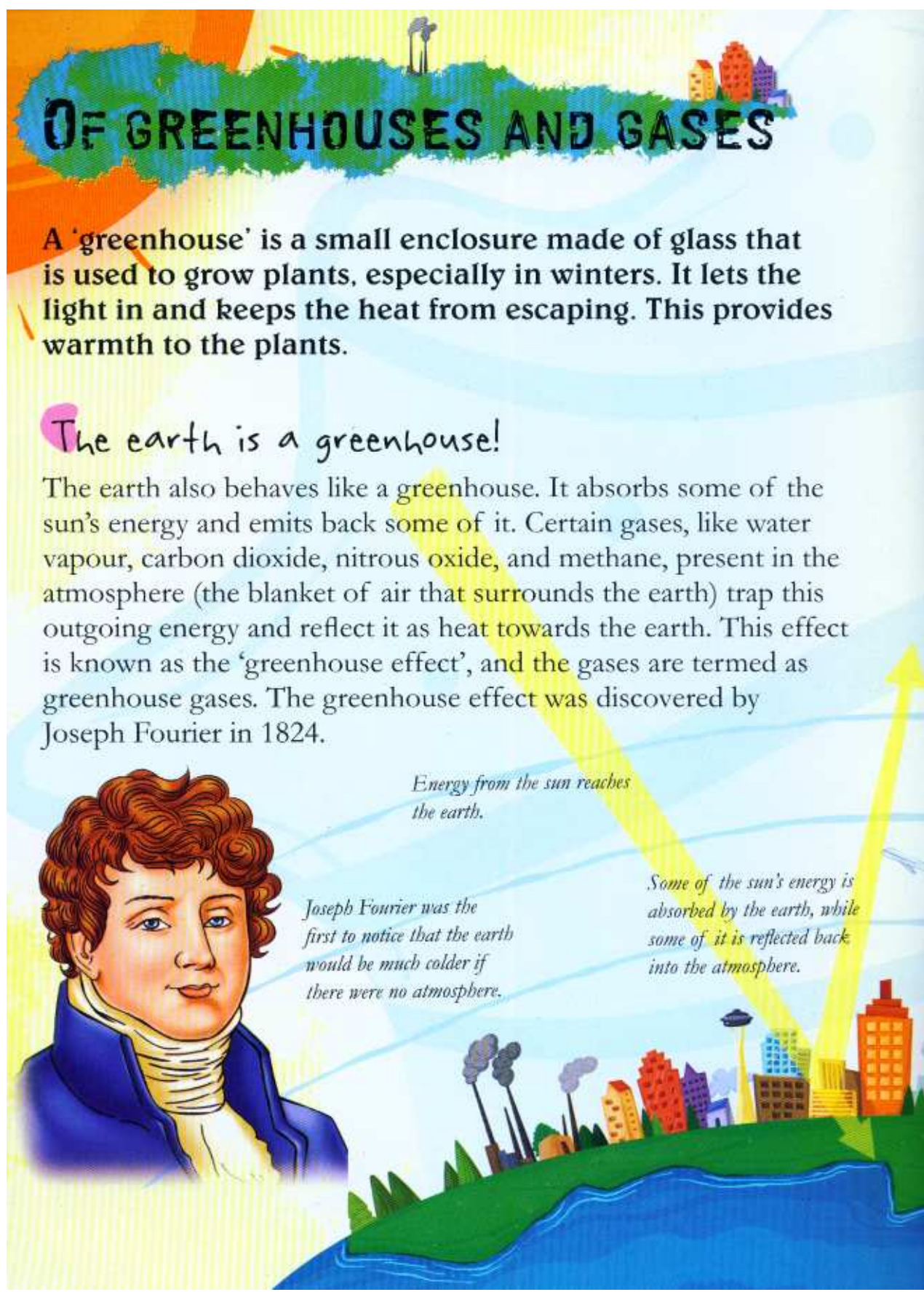
How black is our air?

Black carbon pollution results when tiny particles of carbon are released into the air. These particles are formed when factories and cars burn fossil fuels such as petroleum, coal, and natural gas. Often, poisonous gases attach themselves to these particles. These tiny carbon particles laden with poisonous gases enter our lungs and make us ill.

Forest fires cause breathing problems in animals too.

**GG 4.0
Greencast**

Fumes from vehicles contain fine particles that measure less than 2.5 microns in diameter (a human hair is about 75 microns in diameter!). These cause the most harm to the lungs.



OF GREENHOUSES AND GASES

A 'greenhouse' is a small enclosure made of glass that is used to grow plants, especially in winters. It lets the light in and keeps the heat from escaping. This provides warmth to the plants.

The earth is a greenhouse!

The earth also behaves like a greenhouse. It absorbs some of the sun's energy and emits back some of it. Certain gases, like water vapour, carbon dioxide, nitrous oxide, and methane, present in the atmosphere (the blanket of air that surrounds the earth) trap this outgoing energy and reflect it as heat towards the earth. This effect is known as the 'greenhouse effect', and the gases are termed as greenhouse gases. The greenhouse effect was discovered by Joseph Fourier in 1824.

Energy from the sun reaches the earth.

Joseph Fourier was the first to notice that the earth would be much colder if there were no atmosphere.

Some of the sun's energy is absorbed by the earth, while some of it is reflected back into the atmosphere.

What use is it?

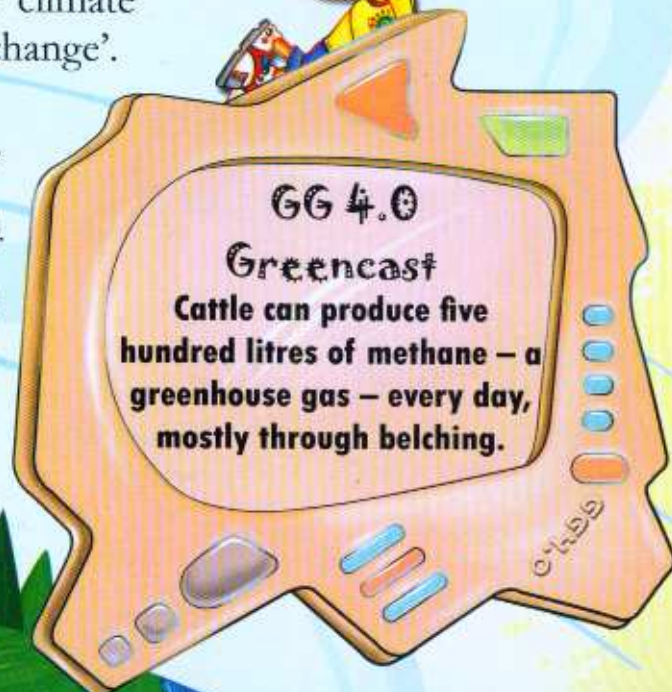
Greenhouse gases help keep the earth warm. If it were not for these gases, the earth would be bitterly cold and unfit to live on!

Some human activities are causing the amount of greenhouse gases in the atmosphere to go up. This increase is leading to global warming, because of which polar ice caps are melting and sea levels are rising. This change in the normal pattern of climate is called 'climate change'.

The gases in the atmosphere prevent some of the sun's heat from escaping the earth. Without them, the earth would be too cold to live on!



Greenhouses are places where plants are grown.



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Greencast
Cattle can produce five hundred litres of methane – a greenhouse gas – every day, mostly through belching.

THE OZONE FACTOR

The earth's atmosphere has five layers. The troposphere starts from the earth's surface. Weather occurs in this layer. The stratosphere starts above the troposphere and is followed by the mesosphere, thermosphere, and exosphere.

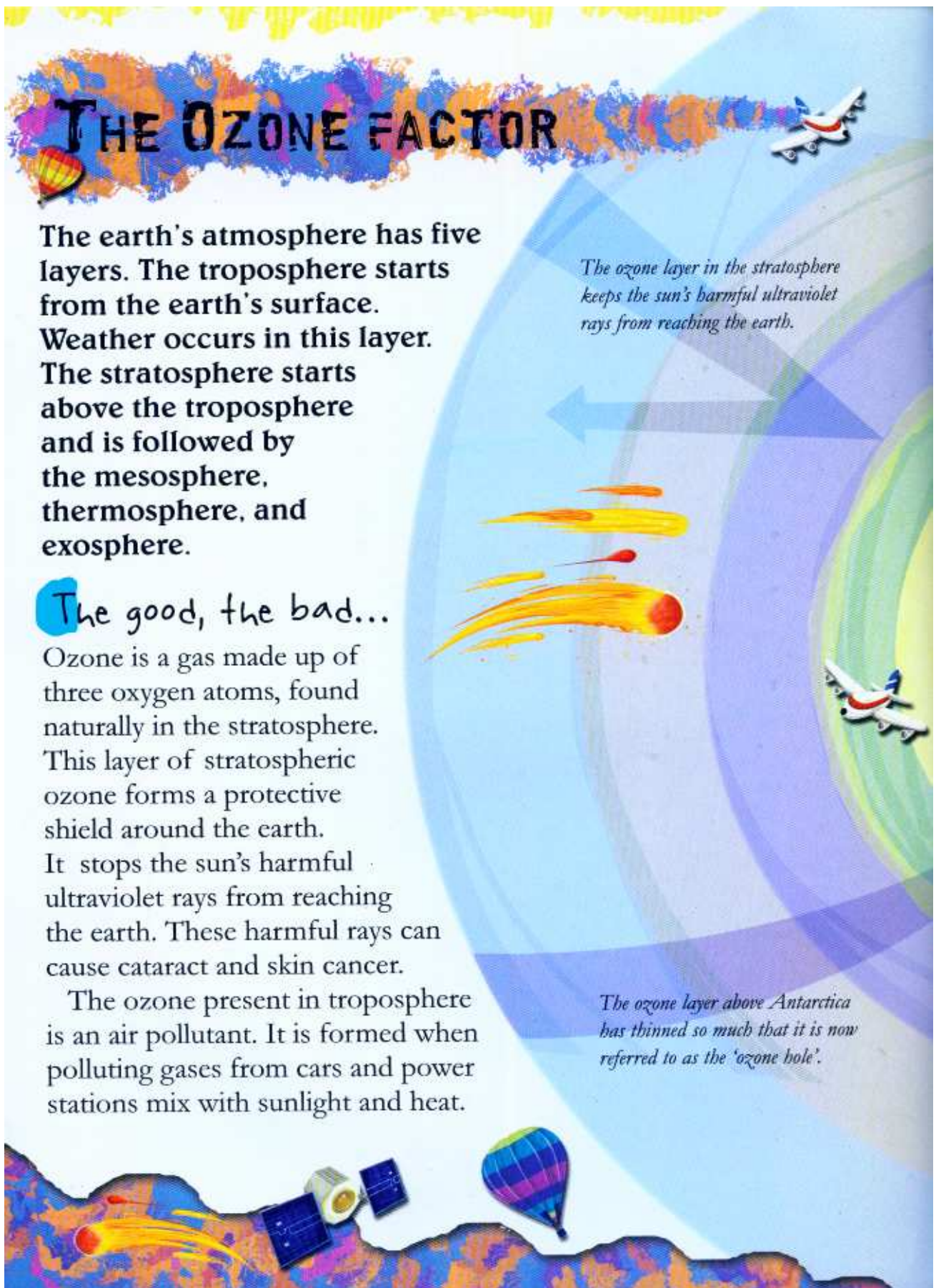
The good, the bad...

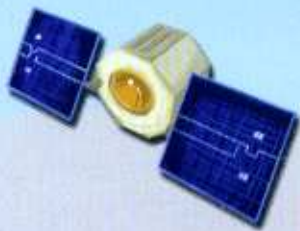
Ozone is a gas made up of three oxygen atoms, found naturally in the stratosphere. This layer of stratospheric ozone forms a protective shield around the earth. It stops the sun's harmful ultraviolet rays from reaching the earth. These harmful rays can cause cataract and skin cancer.

The ozone present in troposphere is an air pollutant. It is formed when polluting gases from cars and power stations mix with sunlight and heat.

The ozone layer in the stratosphere keeps the sun's harmful ultraviolet rays from reaching the earth.

The ozone layer above Antarctica has thinned so much that it is now referred to as the 'ozone hole'.





GG 4.0
Greencast
In 1992, the Antarctic
ozone hole was
larger than the North
American continent.



• Troposphere

• Mesosphere

• Thermosphere

• Exosphere



*Some gases that are commonly given out from
refrigerators, air conditioners, and fire extinguishers
lead to ozone depletion.*

• Stratosphere

...and the ugly

The layer of stratospheric ozone is getting thinner, causing damage such as the melting of the ice in the Arctic. This decrease in the amount of ozone is known as 'ozone depletion'.



IT'S SMOKE! IT'S FOG! IT'S SMOG!



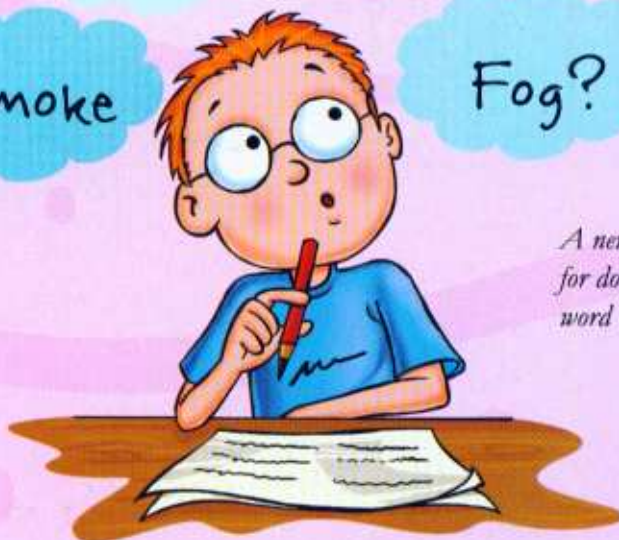
Smog!

Smokfog

For... smoke...

Smoke

Fog?



Often, on a warm and sunny day, you may see a thick haze enveloping your city.

This thick haze is smog. In 1905, Dr H A Des Voeux used the term 'smog', a combination of the words 'smoke' and 'fog', to describe sooty or smoky fogs.

A newspaper thanked Dr H A Des Voeux for doing the public a service by coining the word 'smog' to describe London's smoky fog!

Grey or brown?

Smog usually develops during periods of calm weather. There are two types of smog: grey smog and brown smog. The burning of coal and fuel oil releases dust, ashes, soot, and other substances in the air. This causes grey smog. Fumes from vehicles cause brown smog.





If pollution continues to rise, we'll soon need glasses to protect our eyes, and gas masks to filter the air we breathe.

How smog can get you

Smog is made up of many pollutants. However, the most dangerous are fine airborne particles and ozone. This ground-level ozone is a dangerous pollutant, which can cause eye and nose irritation and even lung and heart problems.

GG 4.0 Greencast

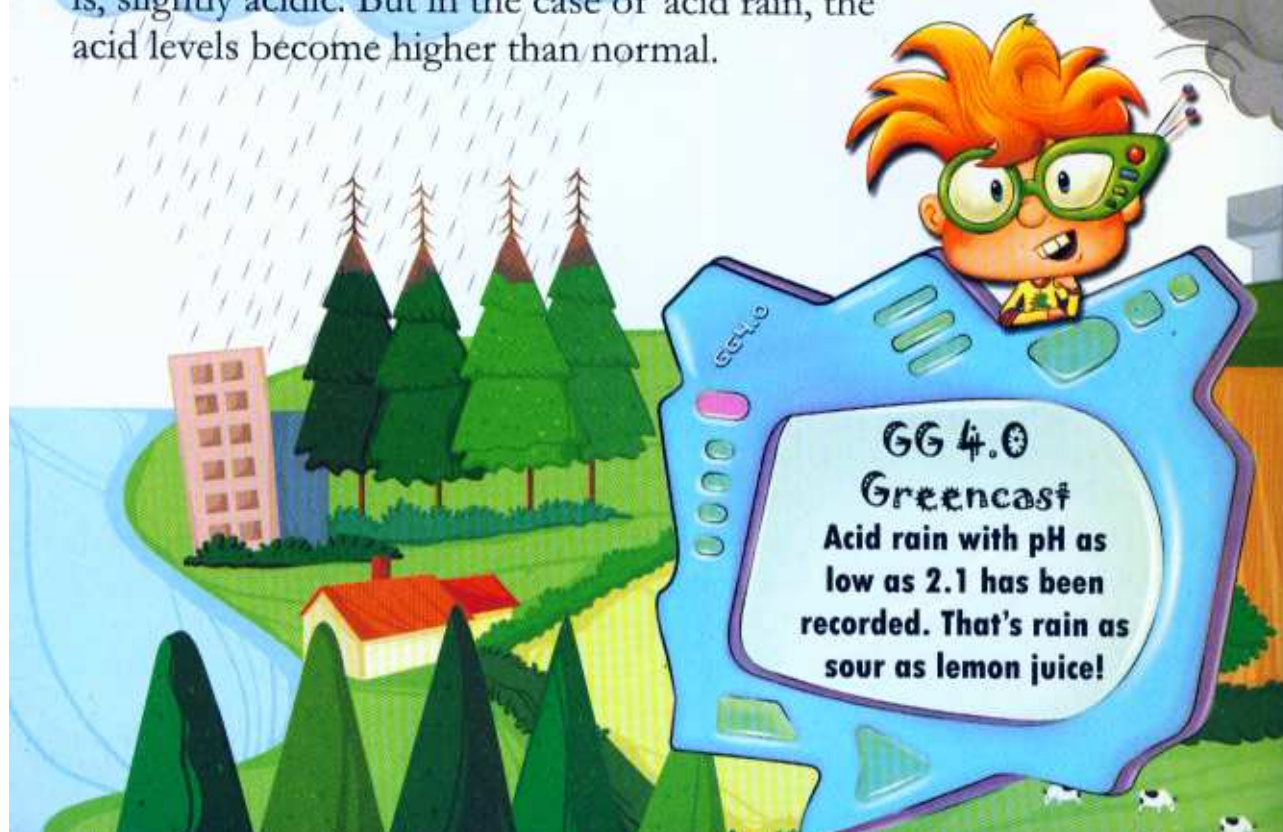
The ultraviolet (UV) rays of the sun help the body produce vitamin D, needed to make bones strong. In the early twentieth century, heavy smog in parts of Europe blocked the UV rays from reaching the earth. This led to a rise in the cases of rickets, a disease which softens the bones.

RAIN, RAIN, GO AWAY!

Industries and vehicles release harmful substances into the atmosphere. These substances combine with the water droplets in the clouds to form acid rain. Acid can also combine with snow, mist, and dust, and wind can carry acid clouds over long distances, sometimes over continents!

Why is it called acid rain?

The acidic or basic nature of a substance can be measured using the pH scale. It is a scale of 0 to 14. Substances that have a pH below 7 are termed acidic, while substances that have a pH more than 7 are called basic. Water has a pH of 7 and is called 'neutral'. It is neither an acid nor a base. The pH of normal rain is 5.6, that is, slightly acidic. But in the case of acid rain, the acid levels become higher than normal.



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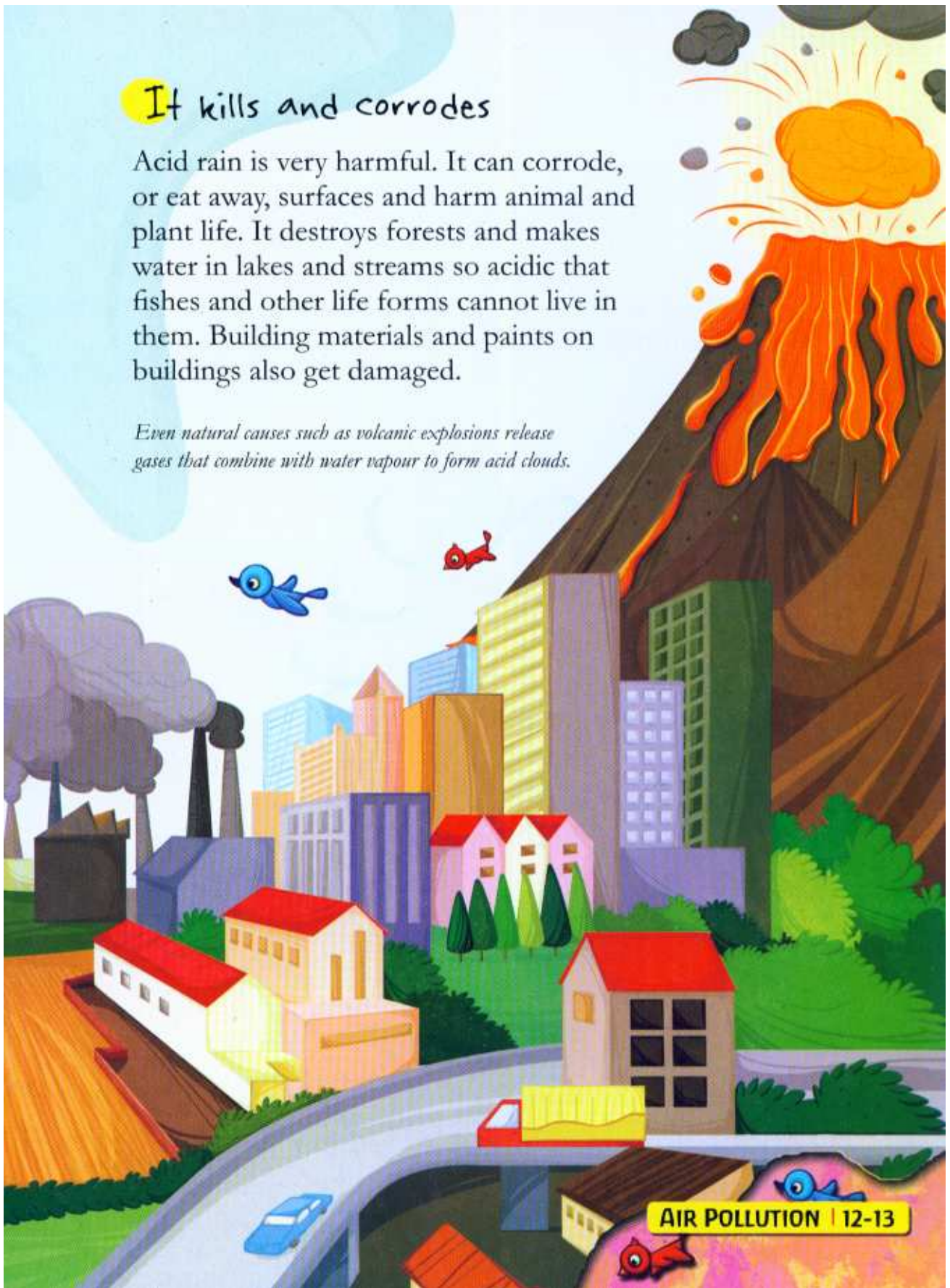
Greencast

Acid rain with pH as low as 2.1 has been recorded. That's rain as sour as lemon juice!

It kills and corrodes

Acid rain is very harmful. It can corrode, or eat away, surfaces and harm animal and plant life. It destroys forests and makes water in lakes and streams so acidic that fishes and other life forms cannot live in them. Building materials and paints on buildings also get damaged.

Even natural causes such as volcanic explosions release gases that combine with water vapour to form acid clouds.



TOPSY TURVY, UPSIDE DOWN!

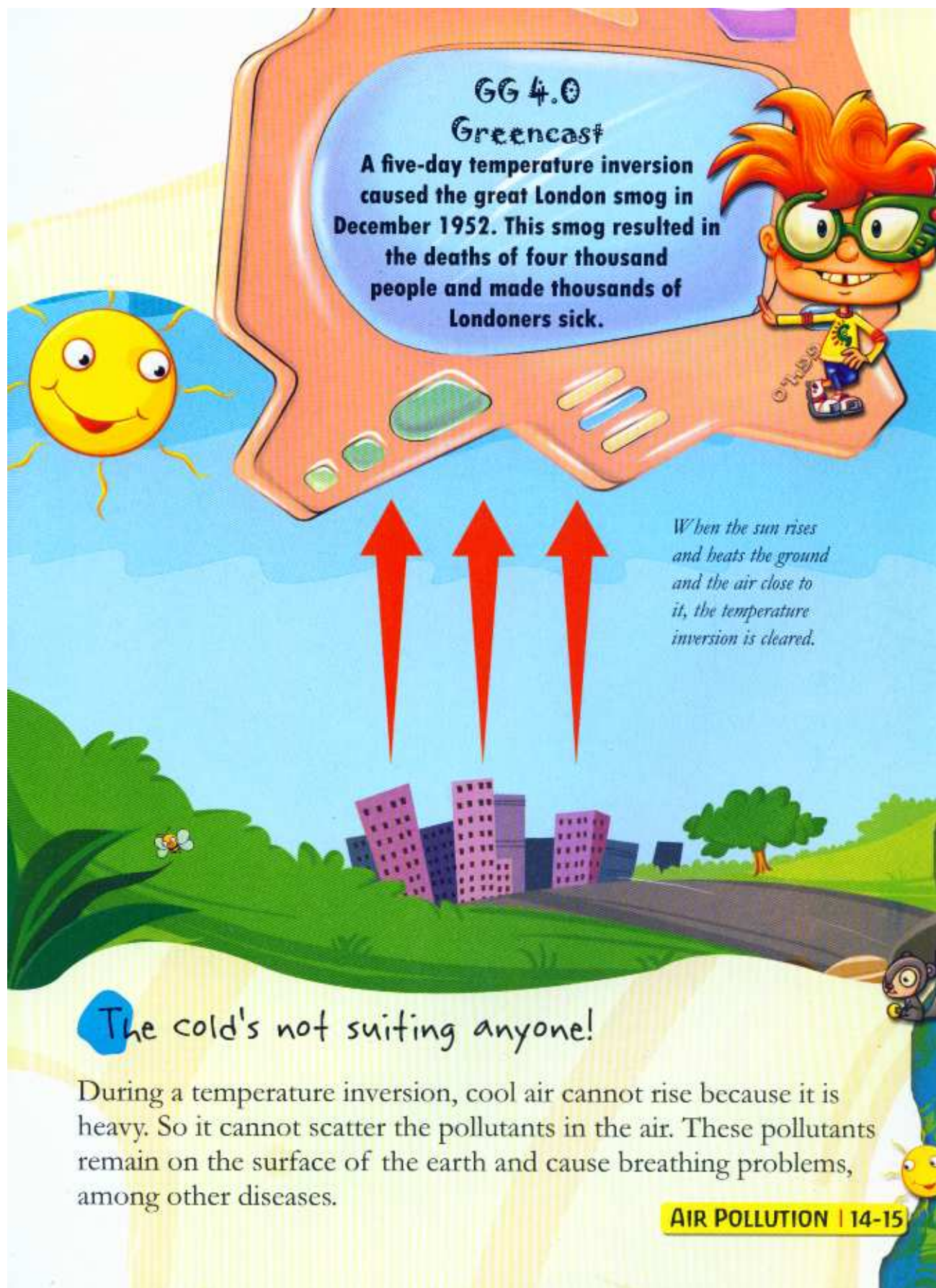
Normally, the air on the earth's surface absorbs heat from the sun and becomes warm. As we go higher up, the temperature drops, and it gets cooler. When the air is warm, it is lighter and rises up. In the process, it carries air pollutants (that are present in the layer closest to the earth) and spreads them at a higher altitude in the atmosphere.

Cold, dense air cannot rise and can create fog near the earth's surface.



But sometimes...

The opposite happens. The air on the surface of the earth is cool, heavy, and dense. But as you go higher, the air gets warmer. This is called temperature inversion (turning something upside down). Temperature inversions are created, generally, on clear, calm nights.



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A five-day temperature inversion caused the great London smog in December 1952. This smog resulted in the deaths of four thousand people and made thousands of Londoners sick.

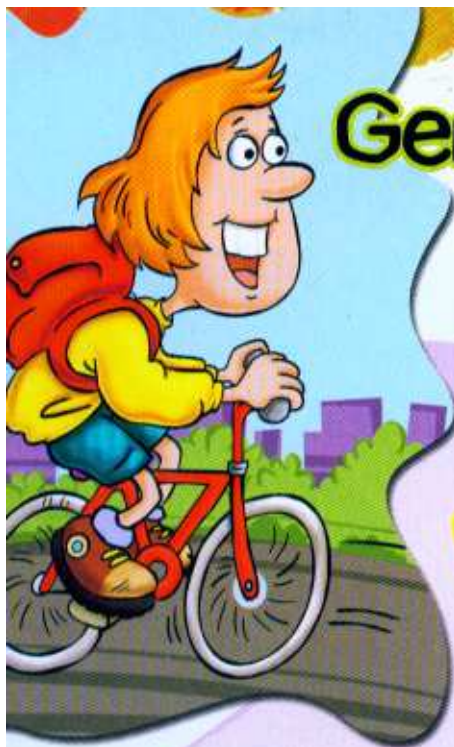
When the sun rises and heats the ground and the air close to it, the temperature inversion is cleared.

The cold's not suiting anyone!

During a temperature inversion, cool air cannot rise because it is heavy. So it cannot scatter the pollutants in the air. These pollutants remain on the surface of the earth and cause breathing problems, among other diseases.

AIR POLLUTION | 14-15

Genius's Greenreel



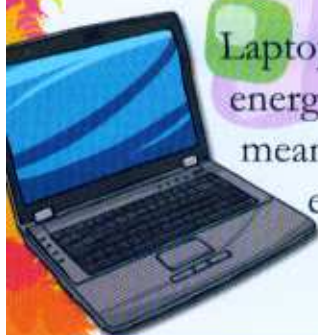
About 40 per cent of all automobile trips in the United States are less than three kilometres—perfect for a bicycle ride.

Ninety per cent of air pollutants in Japan are released from vehicle fumes.

An average adult breathes about 13,200 litres of air each day. Imagine the number of different types of pollutants we inhale each day!

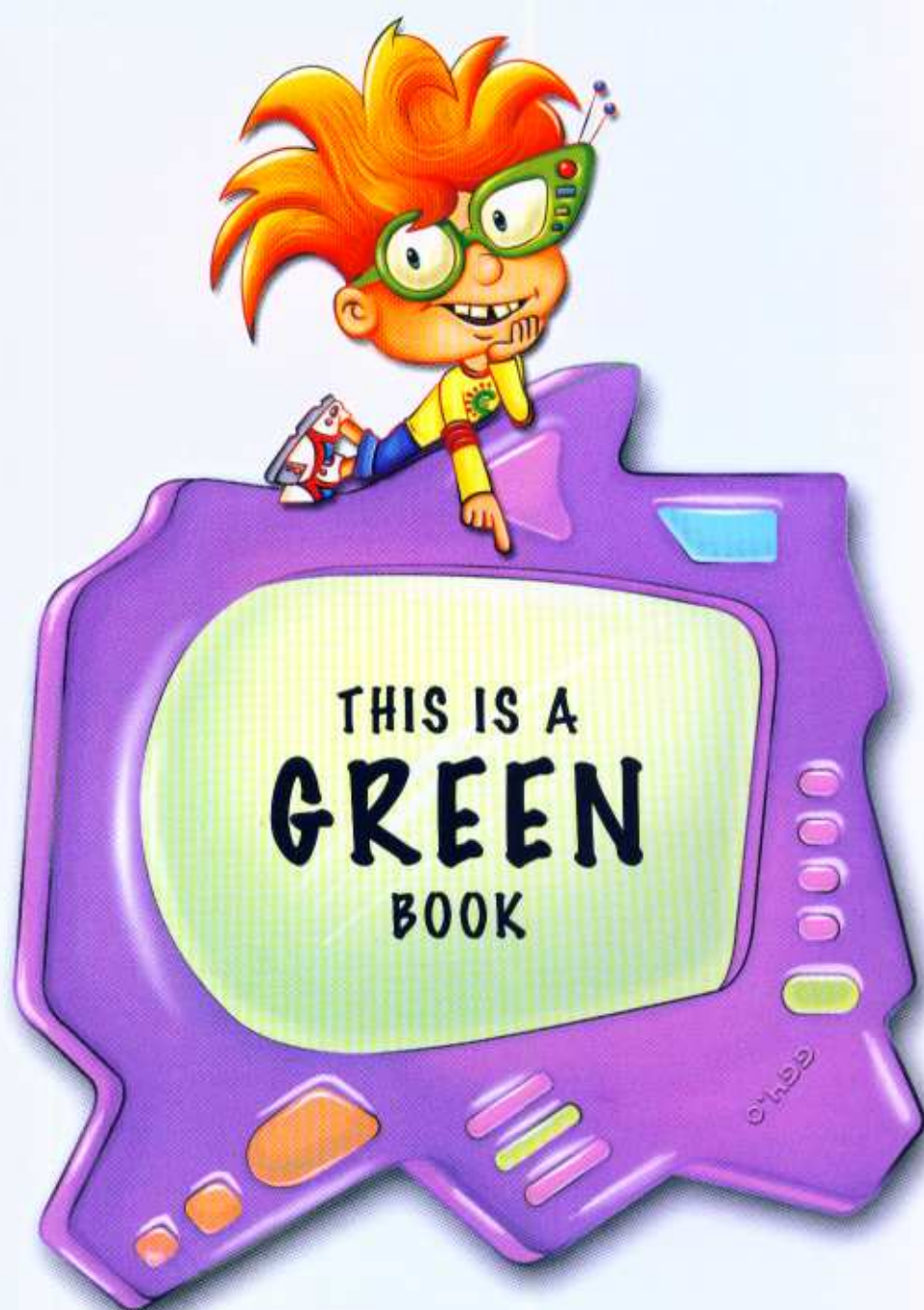
Do you know how the phrase 'once in a blue moon' originated? An eruption on a volcanic island in Indonesia released dust that remained in the atmosphere for over two years. Through this dust, the setting sun looked green and the moon, blue.

The attractive yellow ragwood flower found in North America is actually very dangerous. Its pollen can cause hay fever!



Laptop computers use 90 per cent less energy than desktop computers. This means that less carbon dioxide is emitted in the air to produce the electricity which powers the laptop!





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WHAT are POLLUTION, SMOKE, smog, and more...

Cars and factories keep spewing fumes into the air. Pollutants are destroying the ozone layer that protects us from the sun's harmful ultraviolet rays. And greenhouse gases are causing the earth's temperature to rise. Get to know more about air pollution so that you can protect the planet now.

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What are landfills, vermicomposting, recycling, and more...

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